REMARKS

I. INTRODUCTION

In response to the Office Action dated September 22, 2006, no claims have been canceled, amended or added. Claims 1-3 and 5-27 are in the application. Re-examination and re-consideration of the application is requested.

II. PRIOR ART REJECTIONS

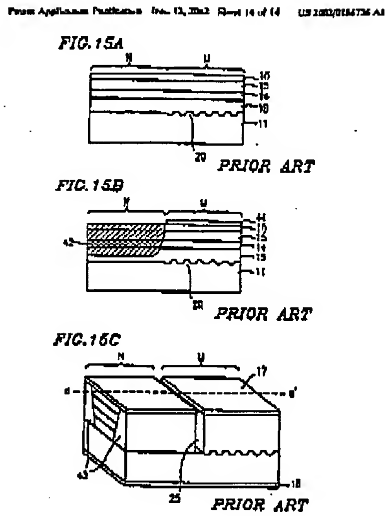
On pages (2) and (3) of the Office Action, claims 1, 5-7 and 27 are rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent Publication 2002/0186736 (Takahashi).

However, on page (3) of the Office Action, claims 2-3 and 8 were indicated as being allowable, if rewritten in independent form including the all of the limitations of the base claim and any intervening claims.

Applicants' attorney acknowledges the indication of allowable claims, but nonetheless traverses the rejections. Applicants' attorney respectfully submits that the rejected claims are patentable over the reference. Specifically, Applicants' claims recite limitations not shown in the reference.

On the other hand, the Office Action asserts that Takahashi teaches all the elements of Applicants' claim 1 in FIG. 15B and paragraphs 0011-0012. These portions of Takahashi are reproduced below, along with paragraphs 0007-0010, which provide additional context:

Takahashi: FIG. 15B



Takahashi: paragraphs 0007-0012

[0007] As a method for fabricating a semiconductor optical integrated device which satisfies the above requirements, partly disordering a core layer composed of a quantum well structure is proposed. For example, Japanese Laid-Open Publication No. 3-89579 discloses a method for integrating a semiconductor laser element having a multiple quantum well (MQW) as an active layer (a distributed feedback (DFB) laser) and an optical waveguide element (an optical modulator) having a disordered MQW as a core layer, as well as a device obtained by this integration method. Hereinbelow, the disclosed method, as well as the construction of the device, will be described with reference to FIGS. 15A to 15C.

[0008] First, referring to FIG. 15A, a p-type InGaAsP optical waveguide layer 19, a MQW core layer 14, an n-type InP upper cladding layer 15, and an n-type InGaAsP contact layer 16 are sequentially formed by metal organic vapor phase epitaxy (MOVPE) on a p-type InP substrate 11 on which a diffraction grating 20 is partly formed. The MQW core layer 14 is composed of ten periods of an InGaAs well layer (thickness: 8 nm) and an InGaAsP barrier layer (corresponding to .lambda..sub.g=1.3 .mu.m, thickness: 11 nm).

[0009] Referring to FIG. 15B, a region M of the resultant structure which is to be a DFB laser is covered with a dielectric film 41 such as an SiO.sub.2 film, while in a region N which is to be an optical modulator, sulfur is diffused so as to be distributed from the surface of the contact layer 16 to the core layer 14. The MQW structure of the core layer 14 is destroyed due to the sulfur diffusion, turning the core layer 14 into a disordered layer 42.

[0010] Thereafter, referring to FIG. 15C, a buried structure for controlling the transverse mode is formed in the following manner. First, the resultant structure is etched to form a mesa along the center in the length direction of the structure. Fe-doped high-resistance InP buried layers 43 are grown by MOVPE on both sides of the mesa along the length of the structure. Electrodes 17 and 18 are formed on both surfaces of the resultant structure, and then a separation groove 25 is formed by etching to separate the two regions. The resultant wafer is cleaved to obtain the semiconductor optical integrated device as shown in FIG. 15C.

[0011] The above conventional fabrication method and construction of the optical integrated device have a feature that the DFB laser region M includes an active layer composed of an MQW structure and the optical modulator region N includes a semiconductor layer in which the same MQW structure is disordered (disordered layer). When a particular impurity is introduced into an MQW structure by diffusion, ion implantation, or the like, the MQW structure is disordered, changing into a bulk semiconductor layer having an average composition of the MQW structure, and thus slightly increasing the forbidden bandwidth. In other words, the optical modulator region N becomes transparent to light emitted from the DFB laser. The optical modulator which is transparent to the laser light allows the light to propagate therein without inducing light loss. Thus, when an electric field is applied to the electrodes of the optical modulator, the laser light propagating in the optical modulator can be modulated with high efficiency.

[0012] In the above conventional method for fabricating a semiconductor optical integrated device, the light emitting element, the light receiving element, and the optical waveguide element can be fabricated simultaneously without the necessity of a complicated processing step. In this conventional method, the core layers of the respective elements, i.e., the light emitting layer of the light emitting element, the light absorption layer of the light receiving element, and the optical guide layer of the optical waveguide element, are simultaneously formed by crystal growth as one continuous layer. Accordingly, the semiconductor optical integrated device fabricated by this method has no displacement or seam between the layers and thus provides a large optical coupling efficiency.

The above portions of Takahashi describe a DFB laser integrated with an electro-absorption modulator (EAM), in which the MQW gain region of the DFB laser is partially disordered to shift its bandgap to make the MQW-EAM section. Specifically, Takahashi states that the MQW structure in the optical modulator region N is disordered by introduction of an impurity. However, a disordered MQW structure is still an MQW structure, albeit one whose optical properties have been altered by the impurities.

Applicants' invention, on the other hand, comprises a tunable laser source including a widely tunable laser including MQWs on top of a common waveguide, wherein the EAM also

uses the common waveguide, but without quantum-wells, and instead using Franz-Keldysh effects.

Note also that the above portions of Takahashi do not include a widely-tunable laser. Instead, the above portions of Takahashi recite a DFB laser that uses MQWs in the modulator for enhanced efficiency, and MQW modulators do not operate over a sufficient optical wavelength range for use with widely-tunable lasers.

Thus, the Takahashi reference does not teach or suggest Applicants' claimed invention. Moreover, the various elements of Applicants' claimed invention together provide operational advantages over the reference. In addition, Applicants' claimed invention solves problems not recognized by the reference.

Consequently, Applicants' attorney submits that independent claim 1 is allowable over the reference. Further, dependent claims 2-8 are submitted to be allowable over the reference in the same manner, because they are dependent on independent claim 1, and thus contain all the limitations of the independent claim. In addition, dependent claims 2-8 recite additional novel elements not shown by the reference.

III. CONCLUSION

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited.

Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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